

55. *Solution of Urinary Calculi.*—M. PELOUSE read to the Academy of Sciences of Paris, March 21st, a report in the name of M. Gay Lussac and himself, on various communications forwarded by M. Leroy d'Etiolles on the subject of the solubility of urinary calculi.

The author first drew attention to the failures of empirical remedies, which have been abandoned one after the other; he then mentioned the proposal of Fourcroy and Vanquelin to suit the nature of the solvents employed to that of the calculous concretions; to attack uric acid calculi with alkalis, the phosphate and oxalate calculi with nitric and muriatic acid, and to inject these substances directly into the bladder. Latterly, it has been asserted, that the mucus which seems to bind or cement the calculous matter together is softened by the action of the alkaline carbonates, and thus a rapid solution or disintegration of uric acid calculi may be obtained.

The experiments of the reporters were of two kinds; some made in the laboratory, others on the living subject. The chemical experiments proved that alkaline carbonates act rather on the mucus and animal matter, by which the particles of calculi are bound together, than on the calculi themselves. The degree of hardness and cohesion of the stone presents a much greater obstacle to its solution than its chemical composition. The alkaline carbonates act extremely slowly on uric acid calculi, even when highly concentrated, and at a temperature of 104° Fahr. When the calculus does not contain any carbonate, the solution proceeds infinitely more rapidly, though the agent employed is comparatively feeble. Experiments made at one of the mineral springs of Vichy furnished the same results, and, with a few exceptions, the solution was equally rapid in calculi of different kinds. A box divided into several compartments, and pierced with holes, was allowed to remain during two months in one of the springs at Vichy. Numerous fragments of calculi were placed in this box. All the fragments were diminished, and some of them remarkably so, but none were completely dissolved; indeed, although none of the original fragments weighed more than 180 grains, when taken from the box they were all much larger in diameter than the urethra. But, although the solution goes on very slowly in the waters of Vichy, it is more marked than the effects obtained by the alkaline carbonates or bicarbonates, and this seems to depend on the great quantity of carbonic acid contained in the Vichy waters, which acts mechanically on the calculi, and hastens their division.

Numerous urinary calculi, and of various composition, were submitted during twelve months to a fluid containing from ten to twenty scruples of carbonate or bicarbonate of potass and soda to the quart of water, at the ordinary temperature of the atmosphere. None of the calculi were dissolved, and some of them appeared unchanged in size; the loss in weight varied from one-fourth to one-half of their original weight. Several fragments of calculi, weighing from five to ten scruples, and placed in a glass funnel, were submitted during three months to a constant current of water, containing one-twentieth of its weight of carbonate of soda. The size of the fragments was not diminished in an evident manner, but they were all more friable; the loss of weight varied from 0.10 to 0.60. Very small fragments of four to eighteen grains generally resist a saturated solution of carbonate of soda at a temperature of 86° to 104° Fahr. during a month; and the majority of calculi are so tenacious, that fragments not larger than a nut are not dissolved or disintegrated until they have been boiled for several days in water containing six scruples per quart of bicarbonate of soda.

Instead of the carbonates, the borates of potass and soda, and nitric or muriatic acids were employed, but with the same results; the borates, however, seemed to be somewhat more efficacious.

The experiments now mentioned show how long and difficult a process it is to effect the solution of urinary calculi, even out of the bladder, and under the most favourable circumstances.

The second series of experiments was made on patients, the majority of whom, previously to having undergone lithotripsy, had tried for several months or even years, alkaline mineral waters or the bicarbonates. It is a matter of cer-

tainty that, in a great majority of cases, the use of alkaline remedies fails to effect the solution of urinary calculi; and those authors were probably deceived who announced the solution of large calculi in a few weeks or months under the influence of an alkaline treatment.

M. Leroy not only regards the use of alkaline drinks and baths as generally inefficient for the cure of urinary calculi, but he thinks it a dangerous practice to force the kidneys to secrete alkaline urine during a considerable length of time. Many other practitioners, and amongst them M. Prunelle, inspector of the Vichy springs, are of the same opinion. He repeats the objection of Marcet and Prout, that the earthy phosphates held in solution by the free acids of the urine may be precipitated when the acids are neutralised, and thus give rise to the calculi containing the phosphate and carbonate of lime or magnesia.

Cases of this kind occur in persons labouring under catarrh of the bladder, where the urine is altered in quality and retained in that organ: they do not occur under other circumstances, and the phosphatic diathesis seems to be an effect of the inflammatory affection of the bladder. The spontaneous changes which take place in the composition of urinary concretions may depend on the same cause; thus, when the urine becomes ammoniacal from inflammation of the bladder, the uric acid concretions are covered with a layer of a phosphate; and hence the great proportion of alternate calculi, which, according to Dr. Prout, form one-fourth of the whole number. M. Prunelle has seen patients who passed considerable quantities of uric acid gravel almost immediately after taking the alkaline waters; in some cases the quantity was such, that, if we suppose the gravel to have been formed in the kidneys, the latter must have been larger than the stomach. Perhaps the use of alkaline remedies occasions, in some patients, an abnormal secretion of uric acid, for we know that the presence of an alkali often gives rise to the formation of an acid.

As the chemical experiments had demonstrated the great difficulty of dissolving urinary calculi, it was thought prudent to confine the experiments made on the living subject to the fragments of stone which remained in the bladder after lithotripsy. The alkaline carbonates and bicarbonates, the caustic alkalies, borax, nitric and muriatic acids, dissolved in water, were injected into the bladder by means of a double syringe, and at a temperature of 95° to 104° Fahr.; from 25 to 250 quarts of fluid were passed through the bladder of the same patient in this way. Some of the patients experienced no inconvenience from the injections, but the majority suffered so much that it was found necessary to discontinue them. In one solitary case the calculous fragments were dissolved in a fluid containing from 0.04 to 0.05 of its weight of nitric acid; they were composed of phosphate of lime and the ammoniaco-magnesian phosphate mixed with a small quantity of uric acid. In several cases the cohesion of the calculi was considerably diminished. 250 quarts of fluid, containing fifteen scruples of the bicarbonate of soda to each quart, were passed through the bladder in one case; the organ was healthy, and the nature and volume of the calculous fragments had been previously ascertained; they underwent no diminution, but became so friable as to be crushed under the slightest pressure of the instrument. In most of the other experiments it was either necessary to suspend the injections, or they produced no effect whatever on the volume or cohesion of the calculous fragments.

Hence, M. Pelouse concludes that the attempt to dissolve urinary calculi by injection into the bladder, does not lead to any satisfactory result. Borax, and the other substances already mentioned, were equally inefficacious.

It has been recently announced in England that Benzoic acid, mixed with a small quantity of borax or alkaline carbonate, is converted into hipuric acid, which is found in the urine. The experiments made by the authors upon this point were not satisfactory; they were never able to detect the slightest trace of hipuric acid in the urine. In many cases, however, they observed that the urine gave out an agreeable odour of alcohol, quite different from its characteristic smell, and remained for several days without undergoing any apparent change whatever.—*Dublin Med. Press*, 20th April, 1842.